



Attorney Docket No.: 1396-00

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In re Application of Seiji Nabeshima et al.

Serial No.: 09/680,088

Filed: October 5, 2000

For: RUST-RESISTANT CALCIUM STEEL

COMMISSIONER FOR PATENTS
Washington, DC 20231

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AUG 28 2002
TC 1700

Sir:

Transmitted herewith is an Amendment in the above-identified application.

— Small entity status of this application under 37 CFR §1.9 and §1.27 has been established by a verified statement previously submitted.

— A verified statement to establish small entity status under 37 CFR §1.9 and §1.27 is enclosed.

x No additional fee is required.

The fee has been calculated as shown below:

(Col. 1)

(Col. 2) (Col. 3)

SMALL ENTITY

OTHER THAN
SMALL ENTITY

	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NO. PRE- VIOUSLY PAID FOR	PRESENT EXTRA
TOTAL	* 3	-	** 20 =	0
INDEP.	* 2	-	*** 3 =	0
First presentation of multiple dependent claim				

RATE	ADD'L FEE
x 9=	\$
x42=	\$
+140=	\$

OR


RATE	ADD'L FEE
x18=	\$
x84=	\$
+280=	\$

TOTAL ADDITIONAL FEE \$0 OR \$

- * If the entry in Col. 1 is less than the entry in Col. 2, write "0" in Col. 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, write "20" in this space.
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, write "3" in this space.

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found from the equivalent box in Col. 1 of a prior amendment or the number of claims originally filed.

- ☐ Please charge my Deposit Account No. 13-3405 in the amount of \$ _____. A duplicate copy of this sheet is enclosed.
- ☐ A check in the amount of \$ _____ is attached.
- ☒ The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. 13-3405. A duplicate copy of this sheet is enclosed.
 - ☒ Any filing fees under 37 CFR §1.16 for the presentation of extra claims.
 - ☒ Any patent application processing fees under 37 CFR §1.17 with the exception of the Issue Fee which we intend to pay by check.



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE



Art Unit : 1742
Examiner : Andrew E. Wessman
Serial No. : 09/680,088
Filed : October 5, 2000
Inventors : Seiji Nabeshima
 : Yasuo Kishimoto
 : Shuji Takeuchi
Title : RUST-RESISTANT
 : CALCIUM STEEL

22469

PATENT TRADEMARK OFFICE

Docket No.: 1396-00

Confirmation No.: 8261

Dated: August 21, 2002

8/13

9/18/02
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SUPPLEMENTAL AMENDMENT

Commissioner for Patents
Washington, DC 20231

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Supplemental to the Amendment filed on August 12, 2002, using marked-up versions of the Claims and also clean copies of such, kindly amend the Application as follows:

In the Claims (Marked-Up Version)

3. (Twice Amended) A Ca-containing rust-resistant steel according to Claim 1, wherein said equilibrium sulfur soluble amount (%S inc.) value is determined in accordance with the following equation (1), including as its parameters the optical basicity calculated from the composition of said oxide inclusions, the casting temperature and the components forming the steel, such equation being

$$\log (\%S \text{ inc.}) = (21920 - 54640\Lambda)/T + 43.6\Lambda - 23.9 - \log [aO] + \log [\text{wt}\%S], \quad \dots(1)$$

wherein

T represents the casting temperature (K) during the continuous casting process,

[wt%S] represents the concentration of S contained in said steel,

[aO] represents the oxygen activity of said molten steel at said casting temperature (T) during a continuous casting process, and

wherein during Al-deoxidation,

$$\log aO = (-64000/T + 20.57 - 2\log[\text{wt}\% \text{Al}] - 0.086 [\text{wt}\% \text{Al}] - 0.102 [\text{wt}\% \text{Si}]) / 3,$$

and wherein during Ti-deoxidation,

$$\log aO = (-60709/T + 20.97 - 2\log[\text{wt}\% \text{Ti}] - 0.084 [\text{wt}\% \text{Ti}]) / 3,$$

and provided that, when Al and Ti are present in said steel, a ~~reduced~~ smaller aO oxygen activity is provided, ~~according to the following equation (2):~~

wherein Λ represents the optical basicity of oxide inclusions according to equation

(2)

$$\Lambda = 1.0 X (\text{CaO}) + 0.605 X (\text{Al}_2\text{O}_3) + 0.601 X (\text{TiO}_2) + 0.78 X (\text{MgO}) + 0.48 X (\text{SiO}_2) + 0.55 X (\text{Cr}_2\text{O}_3) + 0.59 X (\text{MnO}) \quad \dots(2)$$

~~wherein~~

~~A represents the optical basicity of oxide inclusions, and~~ wherein

X (MmOn) represents the cation equivalent of the oxide present, according to the following equation (3):

$$X (\text{MmOn}) = n \times N (\text{MmOn}) / \sum (n \times N (\text{MmOn})), \quad \dots(3)$$

wherein

N (MmOn) represents the mol fraction of oxide present and

n represents the valence of oxygen contained in said oxide.